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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,593	09/10/2003	Back-Woon Lee	YOM-0057	5378
7590		12/05/2006	EXAMINER	
Cantor Colburn LLP		SHERMAN, STEPHEN G		
55 Griffin South Road		ART UNIT		
Bloomfield, CT 06002		PAPER NUMBER		
		2629		
DATE MAILED: 12/05/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary**Application No.**

10/659,593

Applicant(s)

LEE, BAEK-WOON

Examiner

Stephen G. Sherman

Art Unit

2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7-11, 13-18 and 33 is/are pending in the application.
- 4a) Of the above claim(s) 4-6, 19-32, 34 and 35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-11, 13, 14, 18 and 33 is/are rejected.
- 7) ☒ Claim(s) 15-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed the 20 September 2006. Claims 1-3, 7-11, 13-18 and 33 are pending. Claims 4-6, 19-32, 34 and 35 have been withdrawn from consideration and claim 12 has been cancelled.

Response to Arguments

2. Applicant's arguments with respect to claims 1-3, 7-11, 13-18 and 33 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1,13 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 13 and 33, the phrase "at least one of the gate lines and the data lines located adjacent to the white pixel has a line width larger than a width of

other portions of the respective gate and data lines" renders the claims indefinite because it is unclear to the examiner how the gate line or data line located adjacent to the white pixel would have a line width larger than another portion of the line. The statement of "at least one of the gate lines and the data lines located adjacent to the white pixel has a line width" would involve making the entire line width meaning that there would not be a portion of the gate line that is smaller for the line width to be larger than, therefore the examiner is unsure what the claim language means with respect to this limitation. For the purpose of examination the examiner will assume the applicant meant for claims 1, 13 and 33 to have a similar wording to that of claim 10.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claims 1-3, and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutomu (JP 2001-296523) in view of Yoshida et al. (US 6,542,212).

Regarding claim 1, Tsutomu discloses a four color liquid crystal display comprising:

a plurality of pixels including three primary color pixels and a white pixel (Fig. 1), each pixel including a pixel electrode and a switching element;

a plurality of gate lines extending in a row direction for transmitting a gate signal to the pixels (Fig. 7 shows the gate lines extending in a row direction); and

a plurality of data lines extending in a column direction for transmitting data signals to the pixels (Fig. 7 shows the data lines extending in a column direction), wherein the white pixel is smaller than the three primary color pixels (Fig. 1).

Tsutomu fails to explicitly teach each pixel including a pixel electrode and a switching element, and at least one of the gate lines and the data lines located adjacent to the white pixel has a line width larger than a width of other portions of the respective gate and data lines.

Yoshida et al. discloses of a liquid crystal display where each pixel includes a pixel electrode and a switching element (Figure 6 and column 8, lines 25-45 explain that a TFT 38 is formed, which is a switching element, where the pixel electrode would be formed in the intersection area of the gate and data lines shown, which is well known in

the art.), and at least one of the gate lines and the data lines located adjacent to the white pixel has a line width larger than a width of other portions of the respective gate and data lines (Figure 6 shows that the projections from the data lines 32 shown as 42 are larger than the width of the rest of the data lines, and also the width of gate lines 36 are larger at portion 40 than at the other portions of the gate lines.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Yoshida et al. in the display of Tsutomu such that each pixel in the display, including the white pixels will have a portion of the data and gate lines larger than other portions of the lines in order to provide a well-known method of activating the pixel when it is being addressed.

Regarding claim 2, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 1.

Tsutomu also discloses wherein the three primary color pixels include red, green and blue pixels (Fig. 1).

Regarding claim 3, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 2.

Tsutomu also discloses a display wherein the green pixel is spaced apart from the white pixel (Fig. 1).

Regarding claim 7, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 1.

Tsutomu also discloses a display wherein the pixels are arranged in sequence along the row direction (Fig. 1).

Regarding claim 8, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 7.

Tsutomu also discloses a display wherein the three primary color pixels include red, green and blue pixels and the red pixel, the green pixel, the blue pixel, and the white pixel are arranged in sequence (Fig. 1).

Regarding claim 9, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 1.

Tsutomu also discloses a display wherein the three primary color pixels have substantially equal size (Fig. 1).

Regarding claim 10, this claim is rejected under the same rationale as claim 1.

Regarding claim 11, Tsutomu and Yoshida et al. disclose the liquid crystal display of claim 10.

Yoshida et al. also discloses wherein the gate lines intersect the data lines (Figure 6) and the at least one portion having the larger line width does not directly

intersect other larger line width portions of the respective gate and data lines (Figure 6 shows that the portion 42 of data line 32 that is larger does not directly intersect any other of the larger portions of the data lines, as well as the portion 40 of the gate line 36 that is larger does not directly intersect any other of the larger portions of the gate lines.).

8. Claims 13 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanioka (US 5,929,843) in view of Yoshida et al. (US 6,542,212).

Regarding claims 13 and 33, Tanioka discloses a device and method of driving a four color liquid crystal display (see abstract 1-7) comprising:

a plurality of dots (Fig. 2, where 51 is a dot), each dot including red, green, blue, and white pixels (Fig. 2),

a plurality of gate lines for transmitting gate signals to the pixels (Fig. 7, driver 49 drives the gate lines), and

a plurality of data lines for transmitting data signals to the pixels (Fig. 7, driver 47 drives the data lines), the device comprising:

a gate driver (Fig. 7, driver 49) supplying the gate signals to the gate lines;

a data driver (Fig. 7, driver 47) supplying the data voltages to the data lines; and

an image signal modifier (Fig. 1) for converting three-color image signals into four-color image signals (Fig. 1 shows a 3-color signal being converted into a 4-color signal at lines 8), optimizing the four-color image signals (the pseudo-half-tone

processor 14-1 to 14-3 optimizes the 4-color signal), and supplying the optimized image signals to the data driver such that the data driver converts the optimized image signals to the data voltages (Fig. 1, where R", G", B", and W" are the optimized signals and as seen in Fig. 7, these signals are supplied to the display device and the data driver).

Tanioka fails to explicitly teach where at least one of the gate lines and the data lines located adjacent to the white pixel has a line width larger than a width of other portions of the respective gate and data lines.

Yoshida et al. discloses of a liquid crystal display where at least one of the gate lines and the data lines located adjacent to the white pixel has a line width larger than a width of other portions of the respective gate and data lines (Figure 6 shows that the projections from the data lines 32 shown as 42 are larger than the width of the rest of the data lines, and also the width of gate lines 36 are larger at portion 40 than at the other portions of the gate lines.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Yoshida et al. in the display of Tanioka such that each pixel in the display, including the white pixels will have a portion of the data and gate lines larger than other portions of the lines in order to provide a well-known method of activating the pixel when it is being addressed.

9. Claims 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanioka in view of Yoshida et al. (US 6,542,212) and further in view of Morita (US 2002/0196243).

Regarding claim 14, Tanioka and Yoshida et al. disclose the device of claim 13.

Tanioka also discloses a device wherein the image signal modifier comprises:
a data converter converting three-color image signals into four-color image signals (Fig. 1, the section comprising 13-1, 13-2, 13-3, and 11 is a data converter);
a data optimizer optimizing the four-color image signals from the data converter (14-1 to 14-4 is the data optimizer); and
a data output unit supplying the optimized image signals to the data driver (Fig. 7, display controller 44 performs this function).

Tanioka and Yoshida et al. fail to teach supplying the image signals to the data driver in synchronization with a clock; and a clock generator generating the clock, the data driver operating in synchronization with the clock.

Morita discloses a liquid crystal display where supplying the image signals to the data driver is in synchronization with a clock (see para. 239); and a clock generator generating the clock (see para. 239, where there is a control signal generation circuit 74 providing the clock), the data driver operating in synchronization with the clock (para. 239).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Morita in the device of Tanioka and Yoshida et al. in order to have a device where the data driver received image signal at the same rate it output data signals to the display.

Regarding claim 18, Tanioka, Yoshida et al. and Morita disclose the device of claim 14.

Tanioka also discloses wherein the data output unit outputs the optimized image signals by group of four optimized image signals (Figure 7 and column 4, lines 63-65 explain that the display controller 44 reads out the RGB and W binary data from the frame memory and supplies them to a shift register in a serial manner.).

Allowable Subject Matter

10. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Relative to dependent claim 15, the major difference between the prior art of record (Tsutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $W' = \text{Min}(W.\text{sub}.0, 255)$; $R' = R.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$; $G' = G.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$; and $B' = B.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$.

Regarding dependent claim 16, the major difference between the prior art of record (Tsutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $G' = G.\text{sub}.0 + (255 - \text{Max}(R.\text{sub}.0, G.\text{sub}.0,$

B.sub.0)); and $B' = B.sub.0 + (255 - \text{Max}(R.sub.0, G.sub.0, B.sub.0))$, (**Note the claim objection above regarding this claim. The preceding analysis using "B" and "B.sub.0" was how the claim was best understood to be intended by the applicant).

Relative to dependent claim 17, the major difference between the prior art of record (Tutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $W' = (W.sub.0 + \text{Average}(R.sub.0, G.sub.0, B.sub.0))/2$; $R' = R.sub.0 + (W.sub.0 - \text{Average}(R.sub.0, G.sub.0, B.sub.0))/2$; $G' = G.sub.0 + (W.sub.0 - \text{Average}(R.sub.0, G.sub.0, B.sub.0))/2$; and $B' = B.sub.0 + (W.sub.0 - \text{Average}(R.sub.0, G.sub.0, B.sub.0))/2$.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen G. Sherman whose telephone number is (571) 272-2941. The examiner can normally be reached on M-F, 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on (571) 272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SS

1 December 2006

AMR A. AWAD
SUPERVISORY PATENT EXAMINER

